

ADVANCED REINFORCED CONCRETE DESIGN WORKSHOP

THE WORKSHOP

This course will address the advanced topics covered by AS3600 - 2009 as well as all the relevant changes to the Code since 2009. There are eight (8) sessions over the 2 day workshop. The workshop is a continuation of the Reinforced Concrete Design Workshop - General Level also conducted by CCS.

This Advanced Workshop is designed for engineers who understand the basics of reinforced concrete design but now wish to hone their skills further by gaining an even better understanding of the Concrete Code clauses and implications for design. It also covers specialized areas of concrete design that may not be covered adequately in AS3600 - 2009.

All sessions will provide worked examples, tutorial exercises and solutions.

PROGRAMME

DAY 1 - Advanced Course

8.30 - 9.00 Registration

9.00 - 10.30 **SESSION 1 - Advanced Deflection Calculations**

The first session looks at the various methods of calculating the deflection of beams and slabs using the 'simplified and refined methods' of analysis of Section 8.5 from AS3600 - 2009 with emphasis on effective second moment of area I_{eff} and Branson's formula using specific concrete properties. Slab deflection methods will also include rectangular slabs supported on four sides. Tutorial exercises and solutions will follow.

10.30 - 11.00 Morning Tea

11.00 - 12.30 **SESSION 2 - Crack Control**

The session on Crack Control looks at the formula behind Tables 8.6.1 (A) & (B) in the Code which relates bar spacing and bar diameter to steel stress and crack width. The session will also examine a series of other crack equations by noted researchers [e.g. Gergely-Lutz (USA), Beeby (UK), Hughes (UK)] as well as the current British code (BS8110, BS5400), CEB-FIP and Eurocode requirements and compare their results to the equations and charts in AS3600-2009. Tutorial exercises and solutions will follow.

12.30 - 1.30 Lunch - Sit down - Hot and Cold Buffet

1.30 - 3.00 **SESSION 3 - Two way slabs on multiple columns**

This session looks at the design of two-way flat slabs supported by columns where the designer is required to calculate the effective span length L_o , the static moment M_o and then the design moments at mid-span and the supports for the design strips in each orthogonal direction. The out-of-balance moments M^*v at the supports are then used to design for shear and torsion at the supports. Tutorial exercises and solutions will follow.

3.00 - 3.30 Afternoon Tea

3.30 - 5.00 **SESSION 4 - Torsion in Beams**

This session looks at the design of beams which are subjected to direct or indirect torsion. The design method shown will be as per section 8.3 of AS3600-2009. Parameters such as torsion modulus J_t , polygonal area A_p and perimeter u_t will be explained. Tutorial exercises and solutions will follow.

CALCULATORS REQUIRED

DAY 2 - Advanced Course

9.00 - 10.30 **SESSION 5 - Advanced Short Column Design**

In this session we look at Short Column Design to AS3600 - 2009. We then explore the Axial Load-Moment Interaction Graph derivation in more detail but also look an alternative to the standard interaction chart (with axes usually in MPa), with a chart that now has 'dimensionless' axes - in that way any grade of concrete as well as any shape can be used in these charts.

Worked examples, tutorial exercises and solutions will follow.

10.30 - 11.00 Morning Tea

11.00 - 12.30 **SESSION 6 - Advanced Slender Column Design**

Slender column design will be explored in this session with an emphasis on using high strength concrete (ie above 50 MPa). Use of end restraint coefficients to quantify effective length factors for column slenderness effects will be explained. The new requirements for fitment spacing and confinement reinforcement as per Section 10.7 of AS3600-2009 will be explained in detail. Worked Examples & Tutorial Exercises will follow.

12.30 - 1.30 Lunch - (Provided at venue)

1.30 - 3.00 **SESSION 7 - Strut & Tie Design + Longitudinal Shear**

The first segment looks at the design of beams, panels, corbels and other non-flexural elements using strut and tie models. This segment relates to section 7 of AS3600-2009. Topics such as Strut Efficiency factors, Fan vs Bottle shaped fields, prismatic compression members, bursting reinforcement, nodes and ties will be covered. Tutorial exercises and solutions will follow.

The second part of this session looks at longitudinal shear in both beams and hollow core slabs. The new formulas #8.4.2 and #8.4.3 in AS3600-2009 covering design shear stress and shear stress capacity will be explained as well as the new coefficients for shear plane surfaces. Worked examples & tutorial exercises will follow.

3.00 - 3.30 Afternoon Tea

3.30 - 5.00 **SESSION 8 - Fire Design + Vibration of Beams**

This first part of this session addresses fire design according to Section 5 of AS3600-2009. It explains the meaning of FRL values according to the BCA then explains how to determine the FRL to satisfy Structural Adequacy, Structural Integrity and Insulation for beams and slabs.

The second part of this session analyses beams and slabs subject to vibration and how to avoid resonance problems especially as beams and slabs become thinner due to the use of higher grades of concrete. The design steps taken for vibration checking here is based on the Allen & Murray approach.

5.00 - 5.15 **Feedback sheets and Certificate of Attendance.**



SPEAKERS

Argy Beletich BE Hons (Civil), Dip. Teach., Cert. IV in Training and Assessment, FIE (Aust), CPEng.

Argy has spent many years in the Civil & Structural industry. Within the TAFE system he was head of School of Civil Engineering. He was also responsible for development, accreditation and maintenance of courses from AQF levels II to VI in civil-structural engineering, surveying, construction, geographic information systems and hydrology. During other periods in his career he was a University lecturer in Civil Engineering.



In conjunction to his other qualifications he has a TAFE teaching diploma & Certificate IV in Workplace Training and Assessment. He participated in the development of the Institution of Engineers, Australian National Competency Standards for Engineering Associates, Engineering Technologists and Professional Engineers. He is the original author and current co-author of the popular book Design Handbook for Reinforced Concrete Elements.

Paul J. Uno BE MBdgSc MIE(Aust) CPEng Director - Cement and Concrete Services

Paul Uno has over 30 years experience in the design and construction industry. He has worked for companies such as CSR Readymix, Transfield, Boral, Spancrete, Dept. of Housing, Australian Institute of Steel Construction, HH Robertson and the Cement And Concrete Association of Australia.



He presented precast concrete courses nationally for the NPCAA in 2005 and 2006 and was also acknowledged as a key contributor to the NPCAA/CIA publication "Precast Concrete Handbook".

Paul is also the current chairman of the Australian Standards committee BD-066 which is updating the current AS3850 code (Tilt Up Concrete Construction) which will be released in 2012 as the Prefabricated Concrete Elements Code Part 1 - General Requirements, and Part 2 - Building Construction (embracing both Tilt Up and Precast concrete construction).

He has been a member of the American Concrete Institute since 1992 and a member of the Concrete Institute of Australia since 1982. At present he is a consultant, a presenter for Cement and Concrete Services as well as a University Senior lecturer.

He currently lectures in Properties of Materials (Concrete) at Civil Engineering, Sydney University as well as lecturing at UNSW in the faculty of Built Environment in both in Construction Science (Materials) and in Building Structures (Concrete & Structural Steel Design).

Requirements

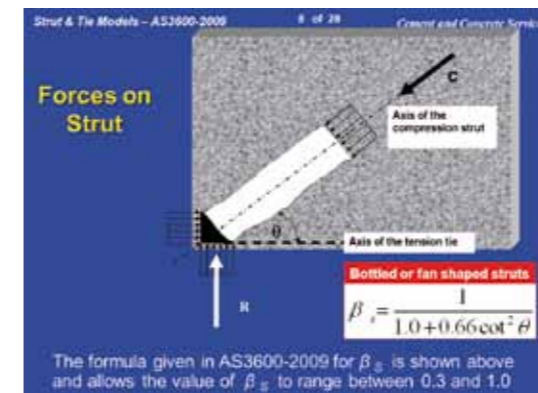
- A scientific calculator
- Concrete Code AS3600-2009

Professional Development

Attendees may be credited towards IEAust Continuing Professional Development (CPD) requirements. Members of IEAust are required to undertake a minimum of 150 hours of equivalent CPD every 3 years.

Further Information

For any further information please contact Joanne on mobile 0413-998-031 or (02) 9899 7447 or email info@cementandconcrete.com.



VENUE

- * Sydney Stamford Grand cnr Herring & Epping Rd, North Ryde NSW (02) 9888-1077
- * Brisbane Holiday Inn, 159 Roma St, Brisbane QLD (07) 3238-2222
- * Melbourne Hotel Grand Chancellor, 131 Lonsdale Street, Melbourne VIC (03) 9656-4000
- * Perth Comfort Inn Wentworth Plaza, 300 Murray St., Perth WA (08) 9338-5000

REGISTRATION FORM

Please return to:

Cement & Concrete Services (Attn: Joanne)
PO Box 913 Baulkham Hills NSW 1755
Phone (02) 9899 7447 Fax (02) 9899 5995 Mobile 0413 998 031
Email: info@cementandconcrete.com

I / We wish to attend the **Advanced Reinforced Concrete Design Workshop** at tick

- Melbourne VIC Mon 2 - Tue 3 April 2012
- Brisbane QLD Mon 17 - Tue 18 September 2012
- Sydney NSW Mon 8 - Tue 9 October 2012
- Perth WA Mon 12 - Tue 13 November 2012

	Number	@	Total
Workshop	<input type="text"/>	\$1,120	<input type="text"/>
Text Required			
• AS3600 - 2009 Code	<input type="text"/>	\$215	<input type="text"/>

Total Payment Cheque \$

[Cheques payable to 'Cement & Concrete Services' note GST already included]

Name

Name

Company

Street / PO Box

Suburb Postcode

Ph () Fax ()

Email

Person Handling Payment (please print)

VISA M.CARD AMEX 4 DIGIT ID#

Cardholders Name

Expiry Date / Signature

NB: Cancellations made more than 5 working days prior to a course will incur a 20% processing fee of the full registration amount. Cancellations made 5 working days or less will incur forfeiture of the full registration fee.